

# Impact of clinical and echocardiographic response to cardiac resynchronization therapy

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The echocardiographic response (reduction of left ventricular end-systolic volume) evaluated at 6 months follow-up, demonstrated to be a better predictor of long-term mortality than improvement in clinical status in a large population of CRT patients. Therefore, assessment of occurrence of left ventricular reverse remodeling at mid-term follow-up may be an adequate surrogate end point in heart failure patients treated with CRT.

The efficacy of [cardiac resynchronization therapy](#) (CRT) has been demonstrated with significant reductions in mortality and morbidity of heart failure patients. However, many studies have evaluated the efficacy of CRT by means of improvement in heart failure symptoms (clinical response) or reduction in [left ventricular](#) volumes (left ventricular reverse remodeling) and improvement in left ventricular function (echocardiographic response) at mid-term follow-up (3 or 6 months after CRT implantation). Based on these surrogate end points, the efficacy of CRT may change significantly and, consequentially, definition of response to CRT is still debated. Ideally, these surrogate end points should determine a significant reduction in mortality. Accordingly, the present evaluation investigated which definition of CRT response at mid-term follow-up (clinical improvement or left ventricular reverse remodeling) best predicts long-term mortality.

A total of 663 advanced heart failure patients were followed-up for the

occurrence of all-cause mortality. At 6 months follow-up, the clinical and echocardiographic responses to CRT were evaluated. Clinical response to CRT was defined as a reduction in New York Heart Association functional class of at least 1 point whereas echocardiographic response to CRT was defined by a reduction in left ventricular end-systolic volume of at least 15%. Based on these definitions, 510 (77%) patients showed clinical response and 412 (62%) patients showed echocardiographic response to CRT. During a mean follow-up of  $37 \pm 22$  months, 140 (21%) patients died.

Clinical and echocardiographic CRT responses were both significantly related to all-cause mortality. However, only echocardiographic response to CRT was independently associated with a superior survival. In particular, a patient who did not show echocardiographic response had a risk of death three times higher than a patient showing a good echocardiographic response (hazard ratio 0.38; 95% confidence intervals, 0.27-0.50; p

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